AMATEUR SATELLITE REPORT

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AMSAT® NA *Newsletter for the Amateur Radio Space Program*

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Board Meeting Highlights

The AMSAT Board of Directors met at AMSAT Headquarters in Silver Spring, Maryland March 12 and 13. Here are the highlights of the two day meeting.

Jan King, W3GEY, currently Vice President of Engineering, was elected Chairman of the Board of Directors. Jan co-founded AMSAT in 1969 and has been a Board member since then. He replaces John Browning, W6SP, who resigned from the Board last month. John Henry, VE2VQ, formerly First Alternate Director, was seated upon W6SP's resignation and participated in the Board meeting as a full voting member. Andy MacAllister, WA5ZIB, elevated to First Alternate Director, did not attend.

Administrative Director Martha Saragovitz was recognized and applauded on having completed 10 years as an AMSAT employee. She will receive a plaque to display on the office wall together with her other meritorious service awards.

Deliberations of the Board covered matters such as liability insurance and hazard insurance, accounting for volunteer labor expenditure, *ASR* costs and the 1988 budget. Income has sagged probably due to AO-10's demise. As a result, unless renewals turn around, the budget will have to be trimmed sharply. The influx of new members and renewals associated with the Phase 3C launch should revive a healthy financial picture, however, all agreed.

Field Operations progress was reported by VP of Field Ops, Doug Loughmiller, KO5I. A strengthened Field organization is at hand Doug said. The AMSAT News Service bulletins will be partitioned into smaller blocks to facilitate transmission through the packet radio network and on to packet BBS. The changes will go into effect in late March.

AMSAT will play a key role in the International Space Year (ISY), if plans continue on course. AMSAT is forced to defend its copyright on its corporate name several times per year at least at a cost of several thousands of dollars in legal fees. New accounting software is being installed at Headquarters to make the bookkeeping easier and more auditable. Telecommunications costs are running at about 10% of the annual budget or about $20,000. Electronic mail comprises more than half of that amount but the expense was recognized as reasonable and the cost of doing business in a dispersed office environment; with volunteers spread all over the world.

Recognition of launch insurance donations will be made in *ASR* at the earliest opportunity. A very important joint AMSAT-TAPR Digital Signaling Processing project was given the go-ahead. The object will be to manufacture for sale special DSP boxes later this spring. The hardware sales will generate a revenue stream to help pay for the PACSAT satellite now being developed and will complement an on-going software sales effort.

A joint Brazil AMSAT and AMSAT NA project for an educational satellite was approved subject to final contract definitization. This satellite will tentatively be launched in 1989 with AMSAT NA's PACSAT.

A collaborative effort with Weber State University in Ogden, Utah is highly desirable and likely the Board was told. Discussions on this subject will continue apace. Weber State built the NUSAT-1 satellite and operated it as well.

Fund raising program initiatives were very much on the Board's mind with PACSAT coming up after Phase 3C and Phase 4 looming large on the horizon.

The minutes of the meeting will be available as soon as the Secretary to the Board finalizes them.

Motorola Donates Complex DSP Package

Steve Sagerian, KAØYRE of Motorola (at least partially responsible for the 68000 board network controller that CAPRA has done) has really come through for the joint AMSAT-TAPR Digital Signal Processing (DSP) project. He arranged for the DSP operations branch of Motorola to come up with two 56001 EXP kits.

This kit comes with bare boards, boot ROMs (a debugger, monitor), PAL's, and several manuals. Just to get things rolling in a hurry Motorola decided to be very generous and throw in two DSP56001 chips. This board has a 20.48 MHz clock and processes 10.25 million instruction per second. Using the architecture to its fullest one could do a 1024 point Fast Fourier Transform (FFT) in 3.48 ms.

Steve and Bob McGwier, N4HY, will be building these two units up. They expect further support from Motorola as they get applications back from AMSAT/TAPR. AMSAT expresses it thanks to Motorola, Inc. for its generous support in the form of several thousand dollars worth of hardware and software!

Brazil AMSAT To Build Educational Satellite With AMSAT NA

Brazil AMSAT (BRAMSAT) and AMSAT North America (AMSAT NA) have agreed in principle to collaborate on a joint educational satellite project. The satellite will carry an advanced voice synthesizer and be designed for easy reception by Amateurs with minimal equipment. Called "Brazil Peacetalker", the satellite will transmit voice telemetry of spacecraft operating conditions as well as a voice greeting to other space faring nations to work towards the peaceful use of space. This theme may lead into the International Space Year now planned for 1992.

Brazil Peacetalker will be designed to be received by schools using minimal equipment and for Amateurs who wish to explore space sciences by logging and studying the telemetry. Preliminary plans have the telemetry read in English while the greeting messages would be articulated in Portuguese, English and Russian. Other languages could be added. The specific messages will be programmable by a ground command station which shall be under the control of international authorities.

The preliminary agreement was reached in Boulder, Colorado March 6 when BRAMSAT President Dr. Junior De Castro, PY2BJO, met with AMSAT NA officials. A definitive agreement is imminent these officials stated. The AMSAT Board of Directors which met March 12 and 13 has reviewed the project and finds it in AMSAT NA's interest to consummate a final accord with BRAMSAT. If plans go forward as expected, the Brazil Peacetalker will be launched in early 1989 into an approximately 800 km high orbit. Plans call for Brazil Peacetalker to be launched with AMSAT NA's packet radio satellite and perhaps a third satellite of the same class.

These satellites will be small but highly capable. An important design criterion is that they be easily heard on the ground with omni-directional antennas.

The satellite will be funded by BRAMSAT and the tasks partitioned between organizations based on a to-be-negotiated Statement of Work. A preliminary design has been completed and construction will begin upon signing of the definitive agreement.

V-21 Launch Success Means Phase 3C Is Even Closer To Launch

Arianespace, the management and marketing arm of the European Space Agency, notched another impressive advance late Friday evening when its V-21 mission lifted flawlessly into a cloudy Kourou sky. The launch just under 4 months since the last success on November 20 and sets the stage for V-22 and V-23 in May.

V-21 lifted off at the very opening of the launch window at 23:28:00 UTC, March 11. The countdown went perfectly with no holds or deviations. It was one of the most trouble-free launches in the Ariane program. The launch countdown and liftoff together with the obligatory post-launch interviews was broadcast on TV on several satellites including Spacenet 1, transponder 19.

Although the countdown proceeded without a hitch, there have been other impediments to V-21's launch. For example, the launch had been delayed approximately two months while Arianespace's extremely conservative management verified some anomalous readings obtained in tests on a third stage engine late last year. A more recent delay was caused by a failed acceptance test procedure on the sophisticated cryogenic HM-10 third stage.

The launcher carried two major telecommunications satellites to orbit. The U.S. Spacenet 3R was built by General Electric and is owned by GTE. This is the first U.S. commercial payload to reach orbit in two years. The European Telecom 1C was also launched. A one week launch delay was incurred when payload specialists made last minute modifications to Telecom 1C to try to avoid problems which now plague its predecessor, Telecom 1A, in orbit.

Spacenet was spun up and deposited in its Geosynchronous Transfer Orbit (GTO) 18 minutes and 28 seconds after launch. At 20 minutes and 37 seconds the huge SYLDA cannister opened and five seconds later Telecom 1C was inserted into GTO. The deployments occurred over northern Africa while in view of the Libreville, Gabon ESA tracking station. Each satellite will soon fire a kick motor to circularize the orbit at geosynchronous altitude. Each will then be maneuvered around the equator to its assigned station. This should occur in a week or two.

The success of V-21 notches another achievement on the road towards getting AMSAT's Phase 3C satellite in orbit. The next Ariane launch is V-22 with Intelsat V scheduled for May 11. V-23 with AMSAT Phase 3C, METEOSAT and PANAMSAT is scheduled for May 26.

AMSAT launch support preparations will swing into high gear about March 29 with the dispatch to the launch site in Kourou, French Guiana, of support teams from AMSAT DL and AMSAT NA.

If all goes well and the launch takes place as scheduled, Phase 3C may be available for general use towards the end of June. Springtime this year would thus be a great time to get your stations ready for the most powerful and capable OSCAR ever!

A reminder is in order too. Many of the technical details of Phase 3C are being published in *Amateur Satellite Report*. *ASR* is a member service so you'll want to insure your membership is current. If you haven't renewed, you should do so immediately so you wont miss out on any of the information crucial to your getting your Phase 3C station up and running and ready for the commencement of operations. Renew your AMSAT membership today.

SA AMSAT Holds Networking Conference

SA AMSAT held a successful networking conference on February 20 according to its President Hans Van de Groenendaal, ZS6AKV. The conference was attended by several Johannesburg Amateurs as well as George Hunt, 7P8DL, Ed Douglas 7P8DX and Phil Gray, KA7TWQ, who is working for CARE in Maputo.

The Lesotho Pilot Packet Radio Project was reviewed and it was decided to continue with the 2 meter link to the Johannesburg-based DCE Gateway. Initial tests showed an additional digipeater is necessary. Later this will be replaced by a 9600 bps 70 cm link. Further discussions addressed linking PBBS's in Southern Africa. An HF gateway is also now linked to ZS6SAT, the SA AMSAT PBBS. The callsign is ZS6KE.

The question of amateur operation from Maputo was discussed. Phil Gray is returning to the U.S. for vacation but says he will seek permission from the Maputo government to operate upon his return.

Solar Physicist Suggests Early Solar Max Possible and Very Intense

According to the Director of Solar Physics Research at NOAA's Space Environment Laboratory in Boulder, Colorado, the peak of the current solar cycle could occur much earlier than had been expected. And, if current trends continue, it could be the most intense ever recorded exceeding even the monumental heights of the legendary 1957 solar maximum.

Quoted in the March 8 *New York Times*, Dr. Patrick McIntosh believes the next solar maximum could occur as early as the end of 1988 instead of in 1992 as it would if the cycle ran its "normal" 11 year course. The last minimum occurred in September, 1986. Solar activity levels, Dr. McIntosh said, could reach those normally associated with maximums as early as this summer if the current trends continue.

Dr. McIntosh bases his predictions on three key indices: the total number of sunspots and clusters of sunspots; the rate of increase in 10 cm wavelength radio noise; and the progression of "polar crowns" towards the solar poles. Polar crowns are ribbon-like loops of intense magnetic fields the movement of which is closely coupled with high levels of solar activity.

McIntosh cautions that predicting solar activity is particularly risky and the currently rapidly rising trends might just as suddenly flatten out.

Nevertheless, NASA is taking the warnings seriously. During the last solar cycle, NASA was strongly criticized for reacting slowly to warnings the 1980 solar max would occur early and more energetically than usual. As a result, no special measures were taken to save the 85 ton Spacelab. It subsequently deorbited in 1979 spewing debris widely over Australia. This time around NASA is heeding the warnings and says it is drawing up plans to rescue some vulnerable satellites. Ironically, one of its most vulnerable is the Solar Maximum Mission, SMM, the very satellite designed to study such high levels of solar activity. At 293 miles altitude, this satellite could fall from the sky in as little as 11 months from now unless boosted to a higher orbit, NASA said.

Meanwhile, according to reliable U.S. sources, the Soviets are said to be discussing mounting a mission to carefully destroy the now-abandoned Salyut-7 space station to avoid the danger that large chunks of it might survive a fiery plummet to earth in the near future. The Mir space station is in no danger, however, since it maintains its altitude using propulsion from station keeping jets. Mir is periodically refueled from the ground by Progress cargo shipments. No such shipments have been made to the Salyut-7.

The onset of an early solar maximum and especially an intense one could affect AMSAT planning officials said. The lowest flying current OSCAR, UoSAT OSCAR 9, would probably be the first to reenter. Moreover, the expected lifetime of several satellite projects now in the planning and construction stages could be affected. UoSAT-C could, in effect, be launched right during the intense solar maximum if Dr. McIntosh's preliminary data and the trends he sees continue. This would affect its orbital lifetime dramatically. UoSAT-C likely will be launched in early 1989.

Moreover, a hypothetical PACSAT launch from the Mir Space Station, a project that has been under discussion by AMSAT-NA for more than a year, will have to be re-examined in light of the possibility of an intense, early solar maximum AMSAT officials said. A 12 to 18 month lifetime might be expected for a small free-flying satellite at Mir's altitude in a period of a relatively quiet sun. But during a solar maximum, 6 months might be all that could be attained.

Other effects would certainly be seen on RS-10/11. Its 10 meter downlink would often be unheard on the ground because it is well above the F2 layer. When solar activity is high and the MUF is near 29 MHz, signals from satellites outside the ionosphere are refracted back into space and very little reaches the ground. On the brighter side, occasional antipodal propagation of satellite downlinks often accompanies such situations.

The next several months will be very interesting to watch to see if the trends continue, AMSAT officials concluded. "If these predictions turn out to be accurate," one AMSAT pundit was heard to say, "it looks like we'll be having have a flock of 'Chicken Little' contests!"

Transpolar Skitrek Progress Report #7: March 12, 1988

Prepared by Rich Ensign, N8IWJ
AMSAT Science Education Advisor
For Use With The AMSAT Teachers Guide
"Exploring The High Arctic From Your Classroom"

The ears of students and teachers around the world have been glued to scanners and HT's this week as the UO-11 Digitalker began to mark the steady progress of the Russian-Canadian Transpolar Skitrek Expedition over the frozen Arctic Ocean. After a short delay on March 9th and 10th while programming problems were being solved, the Digitalker is now transmitting SARSAT/COSPAS derived positions for the Expedition. In the first few days of the trek, the skiers' own celestial fixes were reported on the Digitalker. It is interesting to note that the celestial and SARSAT/COSPAS fixes are in very close agreement. Measurements taken on March 10th differ by only 1.8 minutes of arc in latitude and 2.5 minutes in longitude, the equivalent of just a few km on the polar ice.

As per the request of the skiers, Digitalker transmissions have been lengthened. Repetition definitely improves the readability of the signal as many of us to the south have found as well. Many hams working with school reception of the morning Digitalker passes have found the HT and whip antenna combination far superior to the vertical antennas at their QTH's. Antenna orientations for best reception often make it look like trek listeners have "gone fishin' or metal locating". Many novel antenna designs are being tried and we'll keep you posted on results.

The Canadian Communications Support Station, CI8C, at Resolute Bay has been monitoring EXØVE, the skiers', 80 meter transmissions and found propagation to be better than expected. Daily messages, relayed to the south by CI8C have given listeners a near real time look at what life on an arctic expedition is like. Here is a message from EXØVE on March 9th after one week "on the ice":

> Frost bite scaring most faces. Toes and fingers permanently numb and painful even when warm. A skier has blisters on his feet and is taking medication for them. We have been making good distance with only one lead blocking us for 1/2-day. Moisture is a big problem in tent, clothing and boots. No chance of drying clothes that are not being worn as they freeze instantly when taken off. Richard (Weber) and Christopher (Holloway) have slept outside every night to avoid condensation from the tent with the success of perfect igloo building skills. Three pairs of Russian skis broken and we will replace them with Canadian. We have received telegrams from (Secretary) Gorbachev and (Prime Minister) Mulroney wishing success. With our 90 km behind us we press on with good steerage and look forward to longer days and warmer weather.

Those alarmed after hearing this report should take a good look at polar expeditions of the past. The extreme is the norm in the arctic and it has been planned for by the leaders of the expedition. The first air drop will take place next week, bringing needed supplies and replacement skis. The trekkers will take a needed rest for a day or so at the time of the drop.

Daily Progress to date:

	03 MAR	7 km	-41C
	04 MAR	20	-28C
	05 MAR	14	-21C
110 km Total	06 MAR	0	(lead blocks trek)
	07 MAR	17	
	08 MAR	20	-40C
	09 MAR	12	-40C
	10 MAR	20	-45C

A continuing series of Progress Reports like this one may be accessed via packet BBS, AMSAT Nets and the main educator source, the WØRPK AMSAT Bulletin Board (1-515-961-3325). Comments and questions about the reports should be addressed to Rich Ensign, 421 N. Military, Dearborn, MI 48124, U.S.A.

Transpolar Expedition Position/Condition Reports Via Nordski COMM & HF

March 8 to March 11, 1988
Progress Synopsis

REP# PRIOR.	DATE/TIME(GMT)	LAT (N)	LONG	REMARKS
Celestial Nav	08MAR88			Digitalker repeats yesterdays data Skiers via HF: -40C and windy. Two skis broken to be replaced with first air drop. Tent is very damp. Two Canadian skiers will sleep in igloo tonight which one of the Russian skiers taught them how to build.
Celestial Nav	09MAR88 12:30	82d 09.3'N	97d 47.0'E	UO-11 Re-programming
Today's conditions are rough. Current temp -40C wind 25km/hour. Expect -47C today with dropping temp tomorrow.				
Celestial Nav	10MAR88 11:58	82d 16.9'N	97d 24.6'E	UO-11 Re-programming
SARSAT/ COSPAS	10MAR88 11:57	82d 18.7'N	97d 22.1'E	-45C
07 000	11MAR88 11:36	82d 28.8'N	97d 13.0'E	

Kettering Group Identifies Mystery Object Shadowing Mir

Last February 9, several dozen Mir watchers in the Denver area saw a mysterious second object shadowing the Russian Space Station across the sky. AMSAT Regional Coordinator Jack Crabtree, AAØP, reported seeing flashes from the second object. But it was not seen subsequently. A call went out to help identify the mystery object. Now the call has been answered by the famous Kettering Group of Northants, England. According to Geoff Perry, the group's oft-quoted leader, the answer lies in an analysis of the orbital elements of objects in orbits near to Mir. Perry says the best fit results from assuming the object was the Soyuz TM3 module. Computer projections by Kettering for the view from Denver that night show the TM3 would indeed have been seen as it had been thus strongly suggesting an ID for the mystery object: the Soyuz TM3 module!

Meanwhile, L.C. "Doc" Emerson, W4ITJ, believes he has identified the object as the Kvant 1A module. According to his data, Kvant 1A was aligned closely with Mir at the time in question too. Perry has considered the Kvant as a candidate but, working from a different orbital element set than Emerson, concluded it was not Kvant by the Soyuz TM3 the Coloradians saw. And so the mystery deepens.

JAMSAT Elects New Officers

JAMSAT has announced the election of its officers. The new president is Masao Tanikawa, JR1HAL. Harry Yoneda, JA1ANG, did not seek re-election as JAMSAT president. Mr. Yoneda continues to serve on AMSAT NA's Board of Directors. JAMSAT Vice Presidents elected included Mori Ohara, JK1VXJ, and Kimio Maekawa, JA9BOH.

Others elected include:

Board of Directors

JA1CG Haruo Takahashi
JA1AYO Kazuo Niwa
JR1FIG Saya Fukasawa
JR1HAL Masao Tanikawa
JR1ING Youichi Kikukawa
JR1SWB Miki Nakayama
@ UNEP in Nairobi 5Z4WB
JK1VXJ Mori Ohara
JM1MCF Yuu Kato
JN1AKC Kazunori Iino
JQ1HXT Shinichi Sudou
JA2PKI Tak Okamoto (N6MBM)
JH3BJN Sumio Nakane

Auditor

JH1CMP Morizo Iseki

AMSAT NA joins with other AMSAT-affiliated organizations in congratulating the new officers and wishing them success.

Short Bursts

• Ann Willert, N6GVP, says she accomplished the first U.S. to mainland China QSOs via satellite on January 22, 25 and 26 when she QSOed BY1PK on AMSAT OSCAR 10 from her Los Angeles home. Ann visited Beijing and, after returning to the U.S. last June, she engaged in extensive correspondence with the Director of the BY1PK station to clarify matters involving tracking software and mutual visibility. The payoff came in late January with the first QSO. QSL cards have been received.

• AMSAT callsign badge orders will soon be filled. AMSAT has found a reliable source for the badges. Tooling for production is being prepared. All back orders should be on their way soon. Sorry for the delay while we sought a replacement for Wendell Rice, K6MFJ, who recently retired after many years of service.

• The West Germans have given up trying to free the stuck solar panel on the TVSat-1 satellite. It was launched last November 20 on an Ariane 2 rocket and successfully achieved orbit. But a stuck solar panel has wrecked plans to use the satellite as the centerpiece of a European direct broadcast satellite system. After many tries at freeing the panel including shaking the satellite with the station keeping jets, the authorities concluded there was no more that could be done. It has been declared a total loss. Insurance will cover only about $60 million of the estimated $230 million loss to the German government.

• ZS6SAT is the newest Digital Communications Experiment (DCE) station on UO-11. The station is operated by ZS6IT.

• Dave Medley, KI6QE will be handling the AMSAT 75 meter Pacific Coast net according to Regional Coordinator Ross Forbes, WB6GFJ.

• Rumors suggest the launch of the Russian space shuttle is imminent.

• The USSR has launched an Indian Remote Sensing satellite according to Max White at the Royal Greenwich observatory. The IRS payload was launched March 17 at 0600 southbound from Tyuratam in the USSR. It will be handed over by the Russians for use at the end of the month. The launcher was the SL3 Vostok. Imagery is on S and X band, but RGO believes that a beacon may exist on known Indian frequencies in the 137 MHz band and a search of this region may prove fruitful. The weight of the payload is 950 kg.

AMSAT® NA

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Board Reviews Dues Structure; New Rates Reflect Postal Increase

AMSAT Headquarters announces that a member dues increase will go into effect May 4. Effective May 4th, the new rates are:
U.S. Domestic members: $30 Canada and Mexico: $36 Other foreign: $45

In accord with the Bylaws, a member dues change comprises a Bylaws change. Consequently, the dues change shall be effective thirty days after publication unless 10% of the voting members object in writing. If so, then a general membership vote will be held by mail.

The dues increase was made necessary by increased production and especially postal costs. The Board has directed a 25% reduction in the cost of *ASR* and has asked the president to provide members a view as to how dues are spent. (Currently *ASR* consumes more than 25% of the AMSAT annual budget, i.e., costs more than $50,000 per year.) The Board meeting held March 12 and 13 approved the dues changes. The last dues increase was in April 1983.

Beginning May 1, all overseas annual members will receive *ASR* directly from AMSAT via Air Mail. Previously, re-mailers had helped in distribution by re-mailing from their locale. However, the additional delays incurred and complaints from members concerning the re-mailing process has resulted in the change in overseas mailing method and rates. Overseas Life Members may opt to have their *ASR* sent by Air Mail by remitting the additional postage costs. Otherwise *ASR* will be mailed sea mail to overseas Life Members.

Annual members should renew early to beat the dues increase. You may renew for several years in advance.

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